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UNITED STATES DEPARTMENT OF AGRICULTURE
AGRICULTURAL RESEARCH SERVICE

PUBLICATIONS AND PATENTS

OF THE

EASTERN UTILIZATION RESEARCH AND DEVELOPMENT DIVISION

January - June 1957

Single copies of available reprints may be obtained on request. At the time this list was prepared, the following, marked (*), were not available:

1077, 1080, 1093, 1097, 1106, 1107, 1110

When requesting reprints, please order by number.

Photostat copies of publications usually can be purchased at nominal cost through the Bibliofilm Service of the Library of the U. S. Department of Agriculture, Washington 25, D. C.

Publications and patents of the Eastern Utilization Research and Development Division issued before 1951 are listed in AIC-180 and Supplements 1 to 6; publications and patents from 1951 through June 1954 are listed in AIC-320 and Supplements 1 to 6; publications from July 1954 through June 1957 are listed in ARS-73-6 and Supplements 1 to 5.

This list includes an index which covers AIC-180 and supplements, AIC-320 and supplements, and ARS-73-6 and supplements.

Issued December 1957

PUBLICATIONS

1072. *Anonymous*

EASTERN UTILIZATION RESEARCH AND DEVELOPMENT DIVISION. March 1957.

An information booklet containing a summary of the background, organization, research program, and accomplishments of the Eastern Utilization Research and Development Division (including the Eastern Regional Research Laboratory located at Wyndmoor, Pa., and the Allergens, Dairy Products, and Meat Sections, located at Washington, D. C., and Beltsville, Md.)

1073. *Bassett, E. W., and Harper, W. J. (Ohio Agricultural Experiment Station; work done under Research and Marketing Act contract).*

ACIDIC AND NEUTRAL CARBONYL COMPOUNDS IN SWISS CHEESE. Proceedings of the XIVth International Dairy Congress, Rome, Italy, September 24-28, 1956, Vol. II, Part II, pp. 38-44.

Typical Swiss cheese contained much more pyruvic acid and much less α-ketoglutaric acid than eyeless Swiss cheese; otherwise the carbonyl compounds present were practically the same.

With carbon-14 labeled sodium citrate, acetolactic was shown to be an intermediate in the formation of acetylmethylcarbinol and diacetyl in Swiss cheese. Pyruvic acid from the labeled citrate did not contain labeled carbon. However, the C^{14} from labeled malate appeared only in the pyruvic acid. Only about 2 percent of the C^{14} from labeled acetate appeared in the carbonyl compounds.

The findings provide information concerning the biochemical changes that occur during the ripening of Swiss cheese.

1074. *Clarke, I. D., and Harris, E. H.*

CALCULATION OF STRETCH FROM BALL BURSTING STRENGTH DATA. Journal of the American Leather Chemists Association, *52*, 24-30 (1957).

Equations are derived for calculating percent stretch from plunger rise in the ball bursting strength test, Method E 14. A table of values from 0% to 112% stretch is given. The effect of leather thickness is discussed. Stretch data are compared with those for elongation, Method E 17.

1075. *Cording, James, Jr., Willard, Miles J. Jr., Eskew, Roderick K., and Sullivan, John F.*

ADVANCES IN THE DEHYDRATION OF MASHED POTATOES BY THE FLAKE PROCESS. Food Technology, *11*, 236-240 (1957).

This paper reports the results of experiments on a single-drum drier, with a drum 2 feet in diameter and 3 feet long, for the production of dehydrated mashed potatoes in flake form. It relates operating variables (mainly drum speed) with the rate of mash pickup by the drum and with the rate of production, density, and moisture content of the product. The solids content of the potato varies with variety and growing area, and greatly influences the rate of production and the character of the product. The nature and extent of this influence is shown for potatoes containing 18.5, 20, and 21.5% solids.

1076. *Eckenfelder, W. Wesley, Jr. (Manhattan College), and Porges, Nandor*

MICROBIOLOGICAL PROCESS REPORT. ACTIVITY OF MICROORGANISMS IN ORGANIC WASTE DISPOSAL. IV. BIO-CALCULATIONS. Applied Microbiology, *5*, 180-187 (1957).

A discussion of the application to engineering design of the principles of aerobic treatment of organic wastes developed in the three previous papers of this symposium. Laboratory and pilot plant studies are employed to develop design criteria. Changes in such characteristics as B.O.D., C.O.D., oxygen utilization and sludge accumulation with time are noted and their interrelationships are developed mathematically. Pilot plant data are analyzed to provide a sound basis for scaling up to process design.

*1077. *Edwards, Paul W.*

ADVANCES IN THE PROCESSING OF POTATOES INTO STABLE FORMS - A REVIEW. Ontario Soil and Crop Improvement Association, 1957 Convention Addresses and Proceedings, pp. 117 -124. [Similar article by Paul W. Edwards and R. H. Treadway also appeared in The Guide Post, official publication of the Pennsylvania Cooperative Potato Growers, Inc., *35*, 28-30, 32-34 (1957).]

Recent growth in potato processing is outlined, the importance of processing to the grower is stressed, and processes for converting potatoes into food products are described.

1078. *Fein, M. L., and Filachione, E. M.*

TANNING STUDIES WITH ALDEHYDES. Journal of the American Leather Chemists Association, *52*, 17-23 (1957).

Calfskin and cattle hide which had been processed through the conventional pretanning operations was treated with eight different aldehydes. All these aldehydes interacted with collagen and showed a tanning action as judged by elevation of the shrinkage temperature of collagen and stabilization of its fibrous structure. The shrinkage temperature of the hide substance treated with the various aldehydes in mildly alkaline solutions was raised to 74-84°C, whereas formaldehyde and glyoxal increased the shrinkage temperature of collagen to approximately 89 and 83°C., respectively. In weakly acidic solution glutaraldehyde appeared to be almost as reactive as formaldehyde toward collagen. The tanning action of dialdehyde starch, because of its potential availability at low cost, is of unusual interest.

1079. *Ford, T. F., Choate, W. L. and Heckman, F. A.*

EFFECTS OF SODIUM TETRAMETAPHOSPHATE ON THE CASEIN COLLOID IN MILK. Proceedings of the XIVth International Dairy Congress, Rome, Italy, September 24-28, 1956, Vol. I, pp. 1-16.

The casein colloids in skim milk can be reduced in size and translucent liquids obtained by adding sodium tetrametaphosphate. Ultracentrifugal studies of such treated skim milks in buffers over a wide pH range always showed one dominant centrifugally homogeneous component. In the normal pH range this component has a molecular weight of about 500,000 and a constant sedimentation velocity, the latter increasing on both the acid and alkaline sides, leading in the first case to precipitation and in the second to gelation. Casein precipitated from this treated skim milk contains about 40% more phosphorus than normal casein, and at the same time part of the original casein is non-acid precipitable. Treatment of freshly precipitated mixtures of α-, β-, and γ-caseins with sodium tetrametaphosphate produces a substance with similar ultracentrifugal behavior as this new high molecular weight substance, but similar treatment of fresh laboratory α-casein does not.

*1080. *Greenbank, G. R.*

(ANTIOXIDANTS) FOR FOOD PRODUCTS. In "Encyclopedia of Chemistry," G. L. Clark and G. Hawley, eds. New York, Reinhold Publishing Corp., 1957, pp. 96, 97.

A review of some of the work on the use of antioxidants, synergists and chelating agents in foods. No references.

1081. *Griffin, E. L., Jr., Turkot, V. A., and Roger, N. F.*

CANAIGRE INVESTIGATIONS XII. DRYING CANAIGRE ROOTS IN A DIRECT-FIRED ROTARY DRIER. Journal of the American Leather Chemists Association, *52*, 176-183 (1957).

Canaigre roots can be dried to a stable form in a rotary-type direct-fired alfalfa drier. Root shreds dried to 12% moisture at an inlet air temperature of 900°F. showed no visible scorching or loss of tannin. The extractability of the tannin from the dried roots was substantially the same as from sun-dried shreds.

1082. *Harper, W. J. (Ohio Agricultural Experiment Station; work done under Research and Marketing Act contract).*

LIPASE SYSTEMS USED IN THE MANUFACTURE OF ITALIAN CHEESE. II. SELECTIVE HYDROLYSIS. Journal of Dairy Science, *40*, 556-563 (1957).

Various crude, lipase-containing preparations hydrolyzed triglycerides at different rates and selectively hydrolyzed milk fat. Pancreatic lipase released predominantly fatty acids of the C-12 or higher group, whereas *Aspergillus* lipase released primarily lower acids. Milk lipase, however, released significant concentrations of both the higher and the lower fatty acids. The lipase preparations commonly used in making Italian-type cheeses formed relatively high concentrations of butyric acid, but lipases from different animal sources differed qualitatively and quantitatively. The findings provide a sound basis for selecting lipase preparations that will yield the desired lipolytic changes in the manufacture of Provolone and Romano cheeses and in the preparation of other food products.

1083. *Hipp, N. J., Groves, M. L., and McMeekin, T. L.*

PHOSPHOPEPTIDES OBTAINED BY PARTIAL ACID HYDROLYSIS OF α-CASEIN. Journal of the American Chemical Society, *79*, 2559-2565 (1957).

A partial acid hydrolysis of α-casein was resolved into fractions containing phosphopeptides by chromatography on Dowex 50. The impure fractions were further purified by chromatography and the electrophoretically pure subfractions were analyzed for their amino acid composition on Dowex 50. In addition to phosphoserine the following dipeptides were found: phosphoserylglutamic acid, phosphoserylalanine and phosphoserylphosphoserine. The extensive destruction of serine on complete hydrolysis of the peptides is discussed.

1084. *Hoover, Sam R., Jasewicz, Lenore B., and Porges, Nandor*

AEROBIC PROCESS FOR TREATMENT OF DAIRY WASTES. Proceedings of the XIVth International Dairy Congress, Rome, Italy, September 24-28, 1956, Vol. II, p. 11.

A biochemical study was made of the oxidation of the dilute milk waste from dairy manufacturing plants by the mixed aerobic culture that develops naturally. Determinations were made of the amount and chemical composition of the cell tissue produced, the amount of oxygen required, the effect of temperature, and the minimum concentration of dissolved oxygen required for a maximum rate of growth. Balanced equations were formulated for the growth of the organisms and their subsequent endogenous respiration (auto-oxidation). When laboratory data were confirmed by pilot-plant engineering studies a novel, simple, "fill-and-draw" treatment system was proposed that is especially suitable for plants with a capacity less than 200,000 pounds of milk a day. Nine commercial treatment plants have been built that are based directly on the recommended designs and many other installations have successfully applied the principles developed in these studies.

1085. *Johnson, John A., Nordin, Philip, and Miller, Donald (Kansas State College; work done under Research and Marketing Act contract).*

THE UTILIZATION OF HONEY IN BAKED PRODUCTS. The Bakers Digest, *31*, No. 2, 33-34, 36, 38, 40 (1957).

A review of the investigations of the role of honey in commercial baking, carried out by contract at Kansas State College. Only flavor and color need be considered by the baker in buying honey. It can be substituted for sugar in most baked products and in some definite advantages are shown. Tentative specifications are presented for buying honey for baking use. Replacement of over one-third of the sugar in cakes by honey leads to difficulties, shown to be caused by the Maillard reaction. Practical control of the reaction in baked products is based on adjustment of the acidity of the cake batter.

1086. *Kattan, A. A., Ogle, W. L., and Kramer, A. (University of Maryland; work done under Research and Marketing Act contract).*

EFFECT OF PROCESS VARIABLES ON QUALITY OF CANNED TOMATO JUICE. Proceedings of American Society of Horticultural Science, *68*, 470-481 (1956).

This is a study of the effects of various processing variables on the quality of canned tomato juice, and an investigation of the possibility of modifying these operations to obtain maximum quality. Increasing screen size improved the yield and color of juice. Salting reduced the pH but increased "separation." Addition of citric acid to the juice prior to heat processing permitted the use of lower pasteurization temperatures and less color loss. Color was not affected by time or temperature of storage.

1087. *Kenney, Harold E., and Wall, Monroe E.*

STEROIDAL SAPOGENINS. XLI. WILLAGENIN, A NEW 12-KETO SAPOGENIN. Journal of Organic Chemistry, *22*, 468-469 (1957).

Willagenin, a new 12-keto sapogenin has been isolated from *Yucca filifera*. The infrared spectrum of willagenin indicated that it has the structure 3β-hydroxy-20α.22a,25L-spirostan-12-one. Wolff-Kishner reduction gave sarsasapogenin. Molecular rotation data confirmed the assignment of structure.

1088. *Koenig, N. H., and Swern, Daniel*

ORGANIC SULFUR DERIVATIVES. I. ADDITION OF MERCAPTOACETIC ACID TO LONG-CHAIN MONOUNSATURATED COMPOUNDS. Journal of the American Chemical Society, *79*, 362-365 (1957).

Sulfides are formed by the free-radical addition of mercaptoacetic acid to oleic acid, methyl oleate, methyl ricinoleate, or 10-hendecenoic acid. Diesters have been prepared by esterifying the product from oleic acid, 9(10)-(carboxymethylthio) stearic acid, and by reacting *n*-butyl oleate with ethyl mercaptoacetate.

1089. *Krider, Merle M., Monroe, Harry A., Jr., Wall, Monroe E., and Willaman, J. J.*

STEROIDAL SAPOGENINS XL. SIMPLIFIED PROCEDURE FOR THE QUALITATIVE DETECTION OF CARDIAC GLYCOSIDES. Journal of the American Pharmaceutical Association, *46*, 304-307 (1957).

Plant extracts were partially purified with lead hydroxide and the filtrates subjected to ascending paper chromatography. Those cardiac glycosides characterized by an unsaturated 5-membered lactone ring were detected by color reaction with alkaline 3,5-dinitrobenzoic acid spray. The method was checked by paper chromatography of aglycones formed on acid hydrolysis of positive samples, by infrared spectra of these aglycones, and by bioassay of the glycosides. This simplified procedure is satisfactory for screening plant extracts for cardiac glycosides.

1090. *Miller, Donald, Nordin, Philip, and Johnson, John A. (Kansas State College; work done under Research and Marketing Act contract).*

EFFECT OF pH ON CAKE VOLUME AND CRUMB BROWNING. Cereal Chemistry, *34*, 179-185 (1957).

Excessive browning of cake crumb occurred when high concentrations of honey or reducing sugars were used. Browning was accelerated by increasing pH of the crumb, typical of the Maillard reaction. Browning of the cake crumb can be largely eliminated by use of a potassium bitartrate as a leavening acid to reduce the pH of the crumb below 6.3. The addition of a leavening acid, however, caused premature loss of carbon dioxide during mixing of the batter with concomitant loss of cake volume. Loss of carbon dioxide during mixing was materially reduced and the pH of the cake crumb controlled by coating the leavening acid with hydrogenated vegetable oil. The acid released by heat during the latter stages of baking controlled the final pH and browning of the cake crumb.

1091. *Naghski, J., Reed, L. L., and Willits, C. O.*

MAPLE SIRUP. X. EFFECT OF CONTROLLED FERMENTATION OF MAPLE SAP ON THE COLOR AND FLAVOR OF MAPLE SIRUP. Food Research, *22*, 176-181 (1957).

The effects of controlled fermentation of maple sap were investigated. Preliminary results indicated that fermentation of sap with certain micro-organisms increased the level of maple flavor and color of sirups. Intensities of these characteristics varied with the type of organisms used and the time of incubation.

1092. *Nordin, Philip, and Johnson, John A. (Kansas State College; work done under Research and Marketing Act contract).*

BROWNING REACTION PRODUCTS OF CAKE CRUMB. Cereal Chemistry, *34*, 170-178 (1957).

The nature of the browning reaction products in cakes made with a high concentration of honey or reducing sugars has been investigated. A number of these browning reaction products extracted from cake crumb have been separated by paper chromatography. One of these has an ultraviolet absorption spectrum similar to that of hydroxymethyl furfural. Its R_f in water-saturated *n*-butanol, however, is lower than hydroxymethyl furfural. It rapidly reduces ammoniacal silver nitrate and 2,6-dichlorophenolindophenol in the cold and gives a deep blue color with aqueous ferric chloride. It also is produced in the decomposition of 1-desoxy-1-piperidino-D-fructose and from the condensation products of glucose with phenylalanine and glycine. The compound browns rapidly with amino acids at a neutral pH and appears to be of significance in the browning reaction.

*1093. *Ogg, C. L.*

REPORT ON MICROCHEMICAL METHODS. Journal of the Association of Official Agricultural Chemists, *40*, 379-381 (1957).

This report contains the referee's summary of the activities of the past year and recommendations for future studies.

1094. *Ogg, C. L.*

REPORT ON MICROANALYTICAL DETERMINATION OF PHOSPHORUS. Journal of the Association of Official Agricultural Chemists, *40*, 386-389 (1957).

Referee's report on the results of a collaborative test of a tentative A. O. A. C. method for phosphorus.

1095. *Parker, Winfred E., and Swern, Daniel*

A NOTE ON IMPROVED ISOLATION OF CONCENTRATES OF LINOLENIC ACID AND ETHYL LINOLENATE FROM LINSEED OIL. Journal of the American Oil Chemists Society, *34*, 43-44 (1957).

Linolenic acid and ethyl linolenate concentrates (80-85%) have been obtained from linseed oil fatty acids or ethyl esters in 50-60% yield, based on linolenic recovery, by a single urea complex separation at room temperature.

1096. *Parker, Winfred E., Witnauer, L. P., and Swern, Daniel*

PEROXIDES. IV. ALIPHATIC DIPERACIDS. Journal of the American Chemical Society, *79*, 1929-1931 (1957).

A previously unreported series of peroxides, the C_5 - C_{10} and the C_{12} and C_{16} α, ω-diperacids, have been prepared in high yield from the corresponding dibasic acids and 65% aqueous hydrogen peroxide in concentrated sulfuric acid solution. The products, which are stable at room temperature, were characterized by peroxide oxygen content, x-ray diffraction, polarography, and ultimate analysis.

*1097. *Porges, Nandor*

BIO-OXIDATIVE TREATMENT OF DAIRY WASTES; RESUME OF LABORATORY STUDIES. Proceedings of 3rd Ontario Industrial Waste Conference, Toronto, Ontario, Canada, June 10-13, 1956, pp. 55-61.

A review of laboratory studies on biological treatment of dairy wastes. Purification, sludge production, rate of oxidation are discussed. The equations of synthesis and endogenous respiration are presented as well as their application.

1098. *Porges, Nandor*

MICROBIOLOGICAL PROCESS REPORT. ACTIVITY OF MICROORGANISMS IN ORGANIC WASTE DISPOSAL. I. INTRODUCTION. Applied Microbiology, *5*, 166 (1957).

This is a short introduction to three papers to be presented by panelists participating in a symposium of the above title at the annual meeting of the Society of Industrial Microbiology. Problems vital to industries using agricultural products are mentioned and reference is made to means of treatment. Primary purpose of treatment is production of clean water through activities of microorganisms.

1099. *Ricciuti, Constantine, Silbert, Leonard S., and Port, William S.*

A POLAROGRAPHIC INVESTIGATION OF THE KINETICS OF EPOXIDATION OF UNSATURATED FATTY ACID ESTERS. Journal of the American Oil Chemists Society, *34*, 134-136 (1957).

A polarographic technique which uses a nonaqueous electrolytic solution consisting of 0.25 *M* ammonium acetate in glacial acetic acid is a suitable medium for the investigation of the kinetics of fatty acid ester epoxidations. From the polarographic data, the second order specific reaction rate constants for the perlauric acid epoxidation of vinyl laurate, methyl oleate, and vinyl oleate in benzene at 25°C. were found to be, respectively, 12, 232, and 270 x 10^{-3} 1. $mole^{-1}$ $min.^{-1}$. The Arrhenius equation for the epoxidations of methyl oleate and vinyl oleate by perlauric acid can be expressed as k equals 5.53 x 10^7 $e^{-\frac{11,500}{RT}}$ and k equals 8.61 x 10^6 $e^{-\frac{10,300}{RT}}$.

1100. *Roberts, Norman E.*

FOOD RESEARCH AT THE EASTERN UTILIZATION RESEARCH BRANCH. Food Technology, *11*, 2, 4, 6, 8 (1957).

A brief description of the work of the Branch (now Division) on food, covering research on cherries, processed tomato products, juice concentrates, potato flakes, deep-fat-fried vegetables, maple, honey, dairy products, and meat.

1101. *Rothman, Edward S. and Wall, Monroe E.*

STEROIDAL SAPOGENINS. XXXVIII. 5-PREGNENE-3β, 17α-DIOL-12, 20-DIONE 3-ACETATE. Journal of Organic Chemistry, *22*, 223-224 (1957).

The new compound, 5-pregnene-3β, 17α-diol-12, 20-dione 3-acetate, was prepared from gentrogenin, the newly discovered sapogenin, and the physical constants of the compound and intermediary compounds are described.

1102. *Rothman, Edward S., and Wall, Monroe E.*

STEROIDAL SAPOGENINS. XLII. PARTIAL SYNTHESIS OF 11-KETO DIOSGENIN. Journal of the American Chemical Society, *79*, 3228-3231 (1957).

Gentrogenin was transformed to 11-keto diosgenin and to 11-hydroxy diosgenin by bromination, acetylation, hydrolysis, and reduction.

1103. *Scott, W. E., Ma, Roberta M., Schaffer, P. S., and Fontaine, T. D.*

A SURVEY OF SELECTED SOLANACEAE FOR ALKALOIDS. Journal of the American Pharmaceutical Association (Scientific Edition), *46*, 302-304 (1957).

A report of the chemical examination of 61 species of solanaceae plants for alkaloids is given. Qualitative tests show that alkaloids are present in two-thirds of the species examined.

1104. *Siedler, A. J., Moline, Sheldon, and Schweigert, B. S. (American Meat Foundation; work done under Research and Marketing Act contract), and Riemenschneider, R. W. (EURDD).*

THE STABILITY OF DEPOT FAT FROM BROILERS FED RATIONS CONTAINING ANIMAL FATS TREATED WITH VARIOUS ANTIOXIDANTS. Poultry Science, *36*, 449-450 (1957).

Groups of chicks were fed diets comparable to those used in commercial broiler raising except that the feeds contained 6% choice tallow or grease stabilized with different antioxidants. The depot fats of the chicks, at broiler size, was shown to be unaffected by the antioxidants as judged by AOM stability, color, degree of finish, or flavor. The antioxidants studied were BHT, DPPD, and Santoquin.

1105. *Silbert, Leonard S. and Port, William S.*

EPOXIDIZED ESTERS OF FATTY ACIDS AS INTERNAL AND EXTERNAL PLASTICIZERS FOR POLYVINYL ACETATE. Journal of the American Oil Chemists Society, *34*, 9-11 (1957).

Fatty acid esters containing epoxy or acetoxy groups are compatible with polyvinyl acetate and may be used to prepare post-plasticized latexes of polyvinyl acetate for emulsion paints. The epoxy plasticizers have, in addition, acid scavenging functions which may assist in reducing container corrosion and in improving emulsion stability. Emulsions containing copolymers of vinyl acetate and vinyl epoxystearate were prepared. These latexes had acid scavenging properties and a film prepared therefrom was internally plasticized.

*1106. *Spies, Joseph R.*

COLORIMETRIC PROCEDURES FOR AMINO ACIDS. Chapter in "Methods in Enzymology," vol. 3, New York, Academic Press, 1957, pp. 467-477.

Four spectrophotometric procedures for the determination of amino acids and peptides are described, with a discussion of their applications, advantages, and disadvantages. The methods are based on the blue color formed (1) by phenol reagent (phosphotungstic-phosphomolybdic acid) and tyrosine and/or tryptophan; (2) by ninhydrin and compounds having free amino groups including amino acids, peptides, primary amines, and ammonia; (3) by the complex copper salts of amino acids and peptides. The fourth method is based on the ultraviolet absorption at 230 μ of the copper salts of amino acids and peptides. Ammonia does not interfere in the two copper salts methods.

*1107. *Steyermark, Al, Alber, H. K., Aluise, V. A., Huffman, E. W. D., Jolley, E. L., Kuck, J. A., Moran, J. J., and Ogg, C. L. (Committee for the Standardization of Microchemical Apparatus, Division of Analytical Chemistry, American Chemical Society).*

REPORT ON RECOMMENDED SPECIFICATIONS FOR MICROCHEMICAL APPARATUS. VOLUMETRIC GLASSWARE, FLASKS, PIPETTES, AND CENTRIFUGE TUBES. Analytical Chemistry, *28*, 1993-1995 (1956).

A new type of micro volumetric flask (capacity, 1 to 5 ml.) and graduated delivery pipettes for use with these flasks are described. Also included are specifications for plain and stoppered centrifuge tubes with capacities from 0.5 to 5 ml.

1108. *Swern, Daniel, and Parker, Winfred E.*

CHEMISTRY OF EPOXY COMPOUNDS. XVIII. EPOXIDATION OF LINOLENIC (CIS, CIS, CIS-9, 12, 15-OCTADECATRIENOIC) ACID. Journal of Organic Chemistry, *22*, 583-585 (1957).

The anomalous results reported earlier [*J. Am. Chem. Soc. 67*, 412 (1945)] in the epoxidation of unsaturated triglycerides have now been explained. Linolenic and more highly unsaturated components are responsible. Linolenic acid is rapidly epoxidized to the diepoxy stage but ring-opening reactions and epoxidation of the third double bond take place at similar rates thus preventing formation of the fully epoxidized product, except in low yield (10%).

1109. *Talley, Eugene A., and Fitzpatrick, Thomas J.*

TIME CONTROLS FOR SCHROEDER AND COREY AND GILSON FRACTION COLLECTORS. Analytical Chemistry, *29*, 988 (1957).

The Schroeder and Corey time control mechanism was modified to allow the fraction collector to be used at a relatively high rate of effluent flow without loss of drops between tubes as the carriage moves from one position to the other. For use with deeply colored or turbid effluents two timers were adapted for the Gilson Fraction Collector.

*1110. *Treadway, R. H.*

POSSIBILITIES FOR ESTABLISHING A POTATO STARCH INDUSTRY IN KERN COUNTY, CALIFORNIA. Kern County Potato Growers Association 1957 Yearbook, pp. 13, 141, 143, 145.

This manuscript reviews the history of the potato starch industry, discusses the uses and demand for the product, and summarizes the requirements for establishing a factory. Particular attention is given to the following: cull requirement, potato storage problem, water requirement, waste disposal. Some idea is presented of the cost of establishing a factory.

1111. *Treadway, R. H.*

NEW AND EXTENDED USES FOR POTATOES. Report of Proceedings of 48th Annual Meeting of Vegetable Growers Association of America, Grand Rapids, Mich., Nov. 27-30, 1956, pp. 99-108.

The upsurge in processing is credited with doing much to stabilize the potato market. The development and production of new forms of processed potatoes are outlined. The future of the potato industry is definitely concerned with the development of new and improved processed foods as well as providing the consumer with a high quality fresh product.

1112. *Walens, Henry A., Serota, Samuel, and Wall, Monroe E.*

STEROIDAL SAPOGENINS. XXXV. GENTROGENIN (BOTOGENIN) AND CORRELLOGENIN, NEW SAPOGENINS FROM DIOSCOREA SPICULIFLORA. Journal of Organic Chemistry, *22*, 182-185 (1957).

Two new sapogenins, gentrogenin and correllogenin, have been isolated from tubers of *Dioscorea spiculiflora.* The new sapogenins are 12 keto analogues of diosgenin and yamogenin respectively. Because of their favorable structure, gentrogenin and correllogenin are excellent cortisone precursors.

1113. *Wall, Monroe E., and Jones, Howard W.*

STEROIDAL SAPOGENINS. XXXVI. SIDE CHAIN BROMINATION ISOMERS OF DIOSGENIN AND TIGOGENIN. Journal of the American Chemical Society, *79*, 3222-3227 (1957).

Diosgenin and tigogenin acetates have been brominated in the side chain and the various bromo-isomers isolated and interrelated. In the course of this work, it was found that side chain bromination of sapogenins stabilizes the molecule toward attack by acidic reagents.

1114. *Wall, M. E., and Walens, H. A.*

THE STEREOCHEMISTRY OF 20-ISOSAPOGENINS. Chemistry and Industry, *25*, 818-819 (1957).

A partial synthesis of 20β-tigogenin has been accomplished. The synthesis involves only one asymmetric center and thus permits an unambiguous assignment of the stereochemistry of the sidechain.

1115. *Wall, Monroe E., Willaman, J. J., Perlstein, Theodore (EURDD) and Correll, D. S., and Gentry, H. C. (Crops Research Division).*

STEROIDAL SAPOGENINS XXXIX. OCCURRENCE AND ISOLATION OF GENTROGENIN AND CORRELLOGENIN FROM DIOSCOREA SPICULIFLORA. Journal of the American Pharmaceutical Association, Sci. Ed., *46*, 155-159 (1957).

The isolation and characterization of gentrogenin and correllogenin, two new sapogenins from tubers of *Dioscorea spiculiflora,* are given in detail. The important physical properties are presented, particularly the infrared spectrum.

1116. *Watson, Paul D.*

DETERMINATION OF THE SOLIDS IN MILK BY A LACTOMETRIC METHOD AT 102°F. Journal of Dairy Science, *40*, 394-402 (1957).

A method is presented for the calculation by formula of the percent of total solids in milk from the percentage of fat and the lactometer reading. Various sources of error in the lactometer method are discussed. Three types of lactometers which were designed for use at 102°F. are described. The results of tests on 200 samples of milk which show the deviation of the calculated total solids from the gravimetric total solids are shown graphically, and the accuracy of the results are analyzed statistically. A formula and tables for the calculation of the total solids are presented.

1117. *Weil, J. K., Bistline, R. G., Jr., and Stirton, A. J.*

SYNTHETIC DETERGENTS FROM ANIMAL FATS. IX. TRIETHANOLAMMONIUM, LITHIUM, ALKALINE EARTH, AND OTHER SALTS OF ALPHA-SULFONATED FATTY ACIDS. Journal of the American Oil Chemists Society, *34*, 100-103 (1957).

Ammonium, triethanolammonium, lithium, sodium, potassium, magnesium and calcium salts of α-sulfopalmitic and α-sulfostearic acid were prepared in at least 95% purity and their solubility and surface active properties were studied. Triethanolammonium, acid lithium, and neutral magnesium salts were very readily soluble. Acid calcium and acid magnesium salts had greater solubility at elevated temperatures than corresponding acid sodium salts. Salts forming micellar solutions had better foaming and detergent properties than salts that did not form micelles.

1118. *Weil, Leopold, and Seibles, Thomas S. (EURDD) and Spero, Leonard and Schantz, Edward J. (Fort Detrick)*

PHOTOOXIDATION OF CRYSTALLINE CLOSTRIDIUM BOTULINUM TYPE A TOXIN IN THE PRESENCE OF METHYLENE BLUE. Archives of Biochemistry and Biophysics, *68*, 308-313 (1957).

Photooxidation of crystalline botulinum type A toxin in the presence of traces of methylene blue results in a very rapid detoxification of the toxin. The combining power of the photochemically produced toxoid with the toxin antibody *in vitro* was not reduced as compared to the original toxin. Only a more extensive photooxidation of the toxin resulted in a moderate reduction of this property. Preliminary tests indicate that the protein detoxified by means of photooxidation is antigenic.

1119. *White, Jonathan W., Jr.*

REPORT ON HONEY. Journal of the Association of Official Agricultural Chemists, *40*, 326-328 (1957).

Six honey samples were analyzed for sugars by the selective adsorption method in two laboratories. Generally satisfactory agreement between laboratories was obtained for dextrose, levulose, "maltose," and sucrose values. Values for higher sugars were more variable.

1120. *White, Jonathan W., Jr.*

THE COMPOSITION OF HONEY. Bee World, *38*, 57-66 (1957).

A survey is made of the present state of our knowledge of the composition of honey. The picture has become increasingly complex as new information, obtained by new techniques, has become available. The carbohydrates may originate from the plant, be produced during honey ripening, or may appear afterward. Acids may also originate from the plant or be introduced by the bee, directly or indirectly. The enzymes likewise may originate in the plant or bee; further investigation of nearly all categories of materials present is required before a full understanding may be had of the chemistry and biochemistry of honey and its production.

1121. *Whittenberger, R. T., and Nutting, G. C.*

EFFECT OF TOMATO CELL STRUCTURES ON CONSISTENCY OF TOMATO JUICE. Food Technology, *11*, 19-22 (1957).

Microscopic studies showed the importance of the cell wall to the consistency of tomato juices. When tomatoes were dissected into four tissue fractions, and juice was made from each, it was found that the outer shell and center tissues, containing moderate quantities of cell walls, gave moderately thick juice; that the free juice from the seed cavities, devoid of cell walls, was exceedingly thin; and that the gelatinous envelopes, containing cell walls heavily impregnated with pectin, gave thick juice. Increasing the linearity and surface area of the wall material, as by homogenization, thickened the juices containing cell walls. Consistency was thus concluded to depend on the quantity, shape, and degree of subdivision of the cell walls, and on the occurrence of pectins in them.

1122. *Willits, C. O.*

REPORT ON METHODS FOR MAPLE PRODUCTS. ESTABLISHING NARROWER LIMITS FOR CONDUCTIVITY VALUES. Journal of the Association of Official Agricultural Chemists, *40*, 321-325 (1957).

A large number of conductivity values of American and Canadian maple sirups are statistically analyzed to establish narrow ranges of values defining sirup of acceptable, presumptive, and doubtful purity.

1123. *Witnauer, L. P., and Lutz, D. A. (EURDD), and Sasin, G. S., and Sasin, R., (Drexel Institute of Technology).*

X-RAY DIFFRACTION POWDER DATA OF SOME THIOL ESTERS OF LONG CHAIN FATTY ACIDS. Journal of the American Oil Chemists Society, *34*, 71-72 (1957).

X-ray diffraction powder data were obtained for 14 thiol esters of long chain fatty acids including benzyl, β-naphthyl, *n*-amyl, and *n*-hexyl thiol myristates; thiol palmitates; thiol stearates; and in some cases thiol laurates. All the individual compounds can be readily distinguished and identified by the diffraction data. Long spacings increase regularly with increase in hydrocarbon chain length. The benzyl and β-naphthyl thiol esters crystallize in tilted bimolecular layers while the *n*-amyl and *n*-hexyl thiol derivatives crystallize in tilted monomolecular layers.

1124. *Wrigley, A. N., Smith, F. D., and Stirton, A. J.*

SYNTHETIC DETERGENTS FROM ANIMAL FATS. VIII. THE ETHENOXYLATION OF FATTY ACIDS AND ALCOHOLS. Journal of the American Oil Chemists Society, *34*, 39-43 (1957).

The reaction of ethylene oxide with fatty acids and alcohols derivable from animal fats was interrupted at selected stages and nonionic surface active agents containing an average of 10, 15, 20, 30 and 40 ethenoxy groups per molecule were investigated for detergent, wetting, foaming, emulsifying and other properties related to application. The mechanism of the reaction is discussed.

Zittle, Charles A., and DellaMonica, Edward S.

THE VISCOSITY AND OPACITY OF HEATED β-LACTOGLOBULIN SOLUTIONS: THE EFFECT OF SALTS, AND OXIDIZING AND REDUCING REAGENTS. Journal of the American Chemical Society, *79*, 126-129 (1957).

The viscosities of heated β-lactoglobulin solutions in general are increased by salts with the greatest increases at low pH values (pH range studied: 6.2 to 7.5). There are, however, specific salt effects; sodium phosphate and citrate prevent opalescence in the low pH region, sodium chloride does not. Increases in opalescence and viscosity in general are parallel. Very large increases in viscosity are obtained in the presence of excess sulfhydryl compounds. The probable explanation is the opening of loops formed by disulfide bridges with consequent elongation of the molecule.

Zittle, C. A , DellaMonica, E. S., and Custer, J. H.

EFFECT OF CERTAIN SALTS ON PRECIPITATION OF CASEIN BY CALCIUM CHLORIDE AND HEAT. Journal of Dairy Science, *40*, 280-288 (1957).

The effect of sodium chloride, citrate, and phosphate on the precipitation of casein by calcium chloride and heat, and the reversal of the precipitation at lower temperature, has been investigated. The re-solution of the casein precipitate occurs in the presence of sodium chloride and citrate but not in the presence of phosphate. With an excess of sodium citrate or phosphate, the precipitation of casein by calcium chloride and heat is prevented; with sodium chloride, a large reduction in the amount of precipitate occurs. Both sodium citrate and phosphate act by binding calcium, a reaction that in the case of phosphate leads to the formation of insoluble calcium phosphate. Sodium phosphate is more effective in preventing casein precipitation by calcium chloride and heat at pH 6.6 than at pH 6.1 since more calcium phosphate is precipitated at the higher pH.

REPUBLICATIONS

1039. *Jasewicz, Lenore and Porges, Nandor*

BIOCHEMICAL OXIDATION OF DAIRY WASTES. ISOLATION AND STUDY OF SLUDGE MICROORGANISMS. Proceedings of the 11th Industrial Waste Conference, Purdue University, 1956, p. 560-569.

The assimilative and endogenous sludges of a laboratory dairy waste aeration disposal system are quantitatively and qualitatively investigated for differences in microscopic biota with particular emphasis on the relative importance and possible function of each type of microorganism in the aerobic treatment of dairy waste.

1016. *Walter, H. E., Sadler, A. M., Malkames, J. P., and Mitchell, C. D.*

A SIMPLIFIED SHORT-TIME METHOD FOR MAKING CHEDDAR CHEESE FROM PASTEURIZED MILK. Proceedings of the XIVth International Dairy Congress, Rome, Italy, September 24-28, 1956, Vol. II.

The new method requires only three hours and can be used with conventional equipment, with minor changes in hoops and hooping procedure. The curd is not packed, cheddared, or milled, thus greatly reducing hand labor and manufacturing costs. Two starters are used; the conventional lactic starter, and *Streptococcus durans* which is salt-tolerant. The cheese develops a good, mild flavor, has an excellent body and texture, is almost free of mechanical openings, and has a uniform volume-to-weight ratio.

January - June 1957

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COMPOSITION COMPRISING ALLYL STARCH AND A LOWER ALKYL ITACONATE. U. S. Patent No. 2,794,789, issued June 4, 1957.

Cording, James, Jr., and Willard, Miles, J., Jr.

METHOD FOR CONTROL OF TEXTURE OF DEHYDRATED POTATOES. U. S. Patent No. 2,787,553, issued April 2, 1957.

Cordon, Theone C.

PROCESS FOR UNHAIRING OF HIDES. U. S. Patent No. 2,791,535, issued May 7, 1957.

Filachione, Edward M., and Harris, Edward H., Jr.

TANNING AGENT AND PROCESS. U. S. Patent No. 2,795,478, issued June 11, 1957.

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PROCESS FOR PURIFYING TANNIC ACID. U. S. Patent No. 2,787,635, issued April 2, 1957.

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MICROBIAL HYDROLYSIS OF STEROIDAL SAPONINS. U. S. Patent No. 2,784,144, issued March 5, 1957.

Krider, Merle M., and Wall, Monroe E.

PARTIAL ACIDIC HYDROLYSIS OF STEROIDAL SAPONINS. U. S. Patent No. 2,780,620, issued February 5, 1957.

Krider, Merle M., and Wall, Monroe E.

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METHOD OF MANUFACTURING CHEESE. U. S. Patent No. 2,796,351, issued June 18, 1957.

Willard, Miles J., Jr., and Cording, James, Jr.

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9. Fraction collectors
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11. Hide testing instrument
    1035
12. Hydroxyl content
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13. Inorganic
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